

E-Mobility Design

Tool Suite & Expertise

May 2025

SYN

ELECTROMOBILITY CHALLENGES

RANGE & TRANSPORT PLANNING

The range and technology of electric vehicles is evolving rapidly but is still limited compared to diesel vehicles. Vehicles' autonomy **must be carefully assessed** to ensure it **meets a route's energy demands**: factors such as **weather conditions, terrain, and traffic congestion** must also be considered.

INFRASTRUCTURE & SMART DEPOT

Electric vehicles require **charging infrastructure**, which must be **planned and built**. This can include **charging stations** at depots or along roads, as well as electrical upgrades to accommodate **higher power** requirements of certain electric vehicles.

COSTS & INVESTMENT

Electric vehicles are generally **more expensive** than diesel vehicles at purchase. This means that the **upfront cost** of transitioning to an electric fleet can be **significant**. However, the **lower operating costs** of electric fleet (e.g., lower fuel and maintenance costs) can offset the upfront costs over time.

Solution: Optimal design using our modelling and simulation tools

- Find optimal location for depot
- Design optimal infrastructure sizing
- Design and test charging strategies
- Design and test depot management strategies
- Forecast your on-route energy using AI models
- Build your route schedule or timetable including battery range and energy consumption limitations
- Simulate operational scenarios, including maintenance or power failure
- Track and forecast your assets lifecycle
- Estimate your GHG emissions
- Optimize your total cost of ownership (TCO)
- Plan a seamless transition for your routes and assets



An expertise that goes far beyond design tools

Preparatory studies

Norms & standards
Equipment benchmark



Simulations

Charger to bus ratio
Installed power
Normal operation
Power failure
Peak shaving



Design

Electrical room layout
Charging interfaces layout
CAPEX - OPEX



Call for tenders

Technical specification
Preliminary drawings
Support during tender process



Construction phase

Procurement support
Detailed drawings
Construction supervision

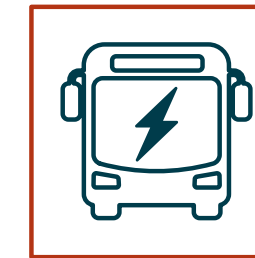


Testing & Commissioning

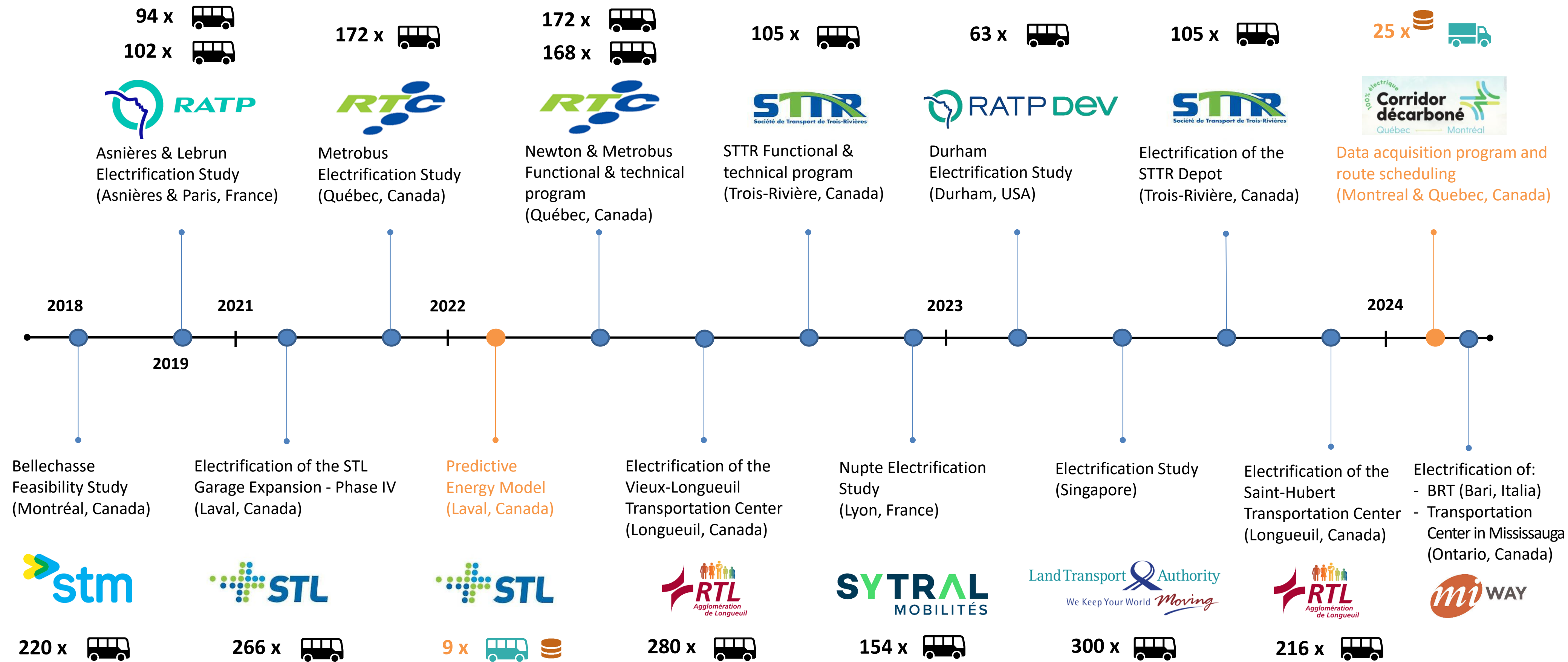
Testing procedures
Integration & functional testing
Smart charging integration

Operation

Lock-out rag out procedure
Maintenance procedures



E-Mobility projects



A suite of **design tools** to help our partners
navigate through **e-mobility challenges**
and **maximize benefits**

Transport
Plan

Energy
consumption

Electrified
vehicle schedule

Electrified
transport plan



Assess
Energy
consumption



Define
Electrified route
schedule



Reduce
Fleet, infrastructure
& power demand

Our proven E-Mobility Design Suite ensures that your transition plan is...

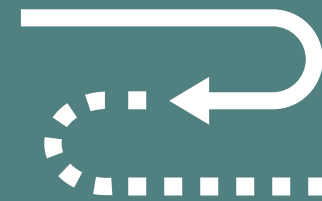
COST EFFECTIVE

UP TO

-60%

of initial CAPEX investment

MINIMIZING DISRUPTION



Electrified operation plan &
charging strategy fully tested

IMPROVING SUSTAINABILITY

UP TO

-70%

In power demand

Define on-route energy consumption according to exogenous variables



Python scripts

Automated scripts on AWS cloud infrastructure

Data acquisition from multiple sources

Access to live and historical data including traffic, climate conditions, vehicles, road network

Data cleaning and processing

Data pipelines, aggregators, and databases

Predictive energy model

High accuracy for known networks and vehicles

Medium accuracy for unknown networks and vehicles

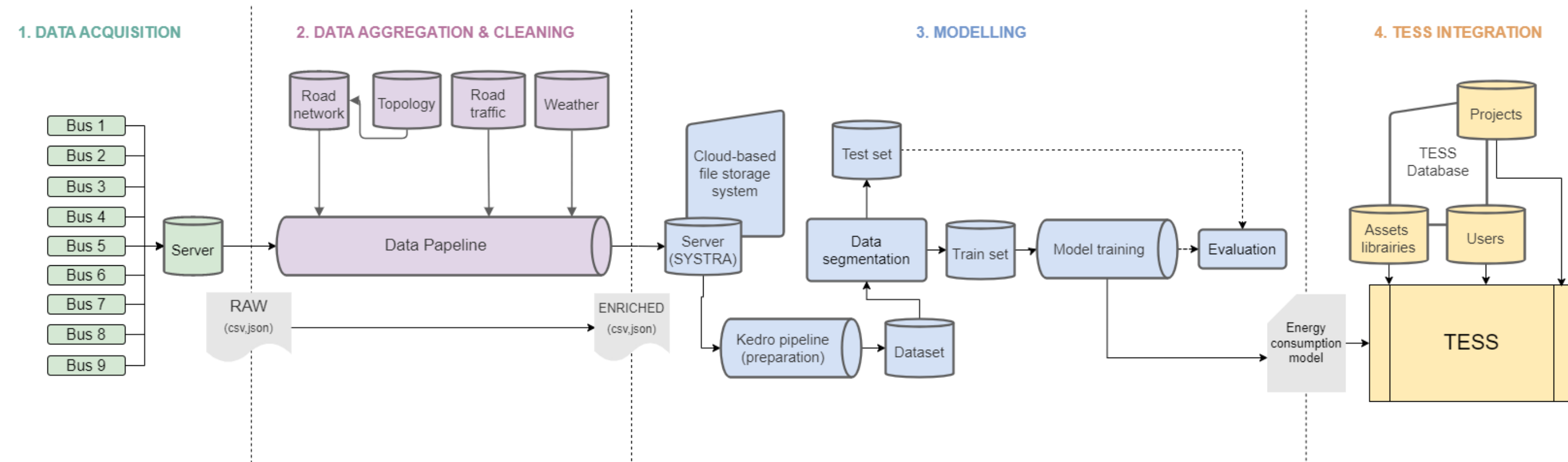
Custom AI model development and training

Using additional client data such as ridership, GTFS, or drivers

Other operational benefits

Eco-driving analysis

On-route consumption analysis



Build your block schedule integrating vehicle energy consumption & autonomy



Web application

Role-Based Access Control to projects

Simple & fast scheduling

Draft a scenario within 30 minutes to an hour

Electric vehicle considerations

Set energy consumption per trip
Set battery autonomy per vehicle

Industry standard inputs

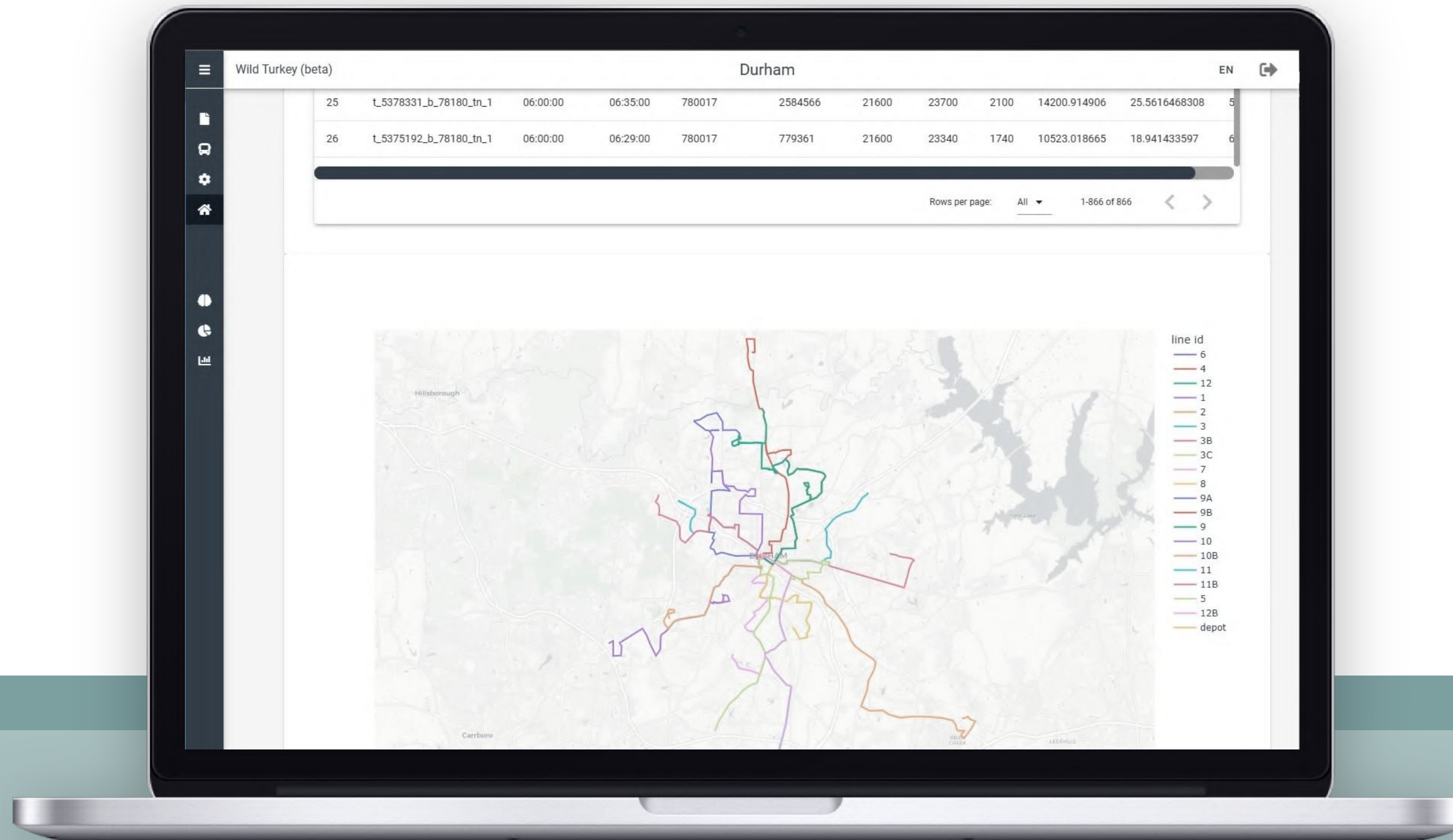
GTFS file
CSV file

Phasing proof

Allow mixed fleet
Allow on-route charging

Convenient exports

Enhanced GTFS CSV export



Model your depot and simulate operation & charging strategies



Web application

Role-Based Access Control to projects.

Integrated physical constraints

Accurately model parking space and depot layout.

Integrated operation constraints

Vehicle parking strategies, Vehicle trip matching strategies, Vehicle charging strategies.

Minimize charging infrastructure

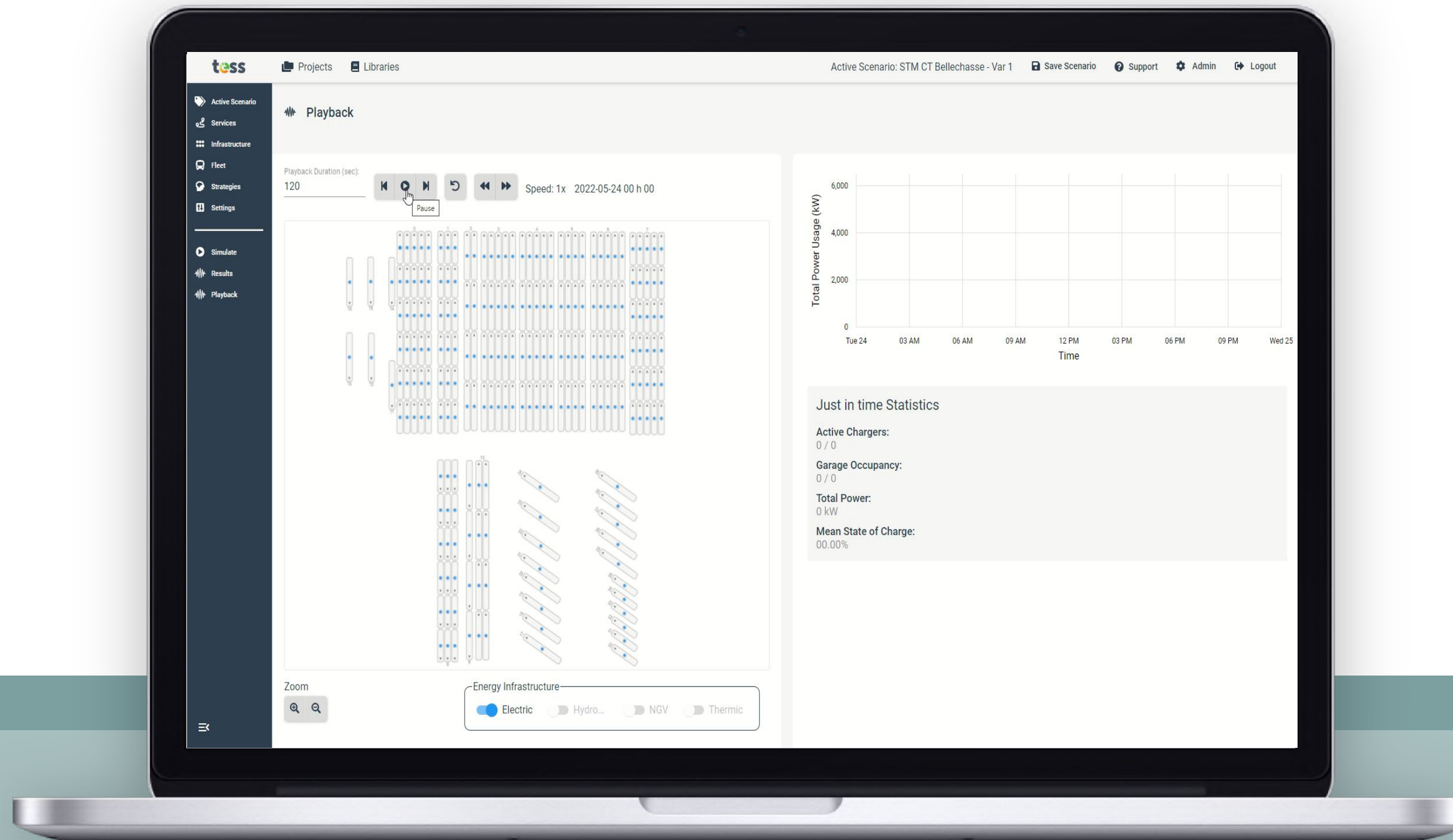
Test ratio: charger scenarios, Try various power capacities, Find the best CAPEX/reliability ratio.

Minimize power demand

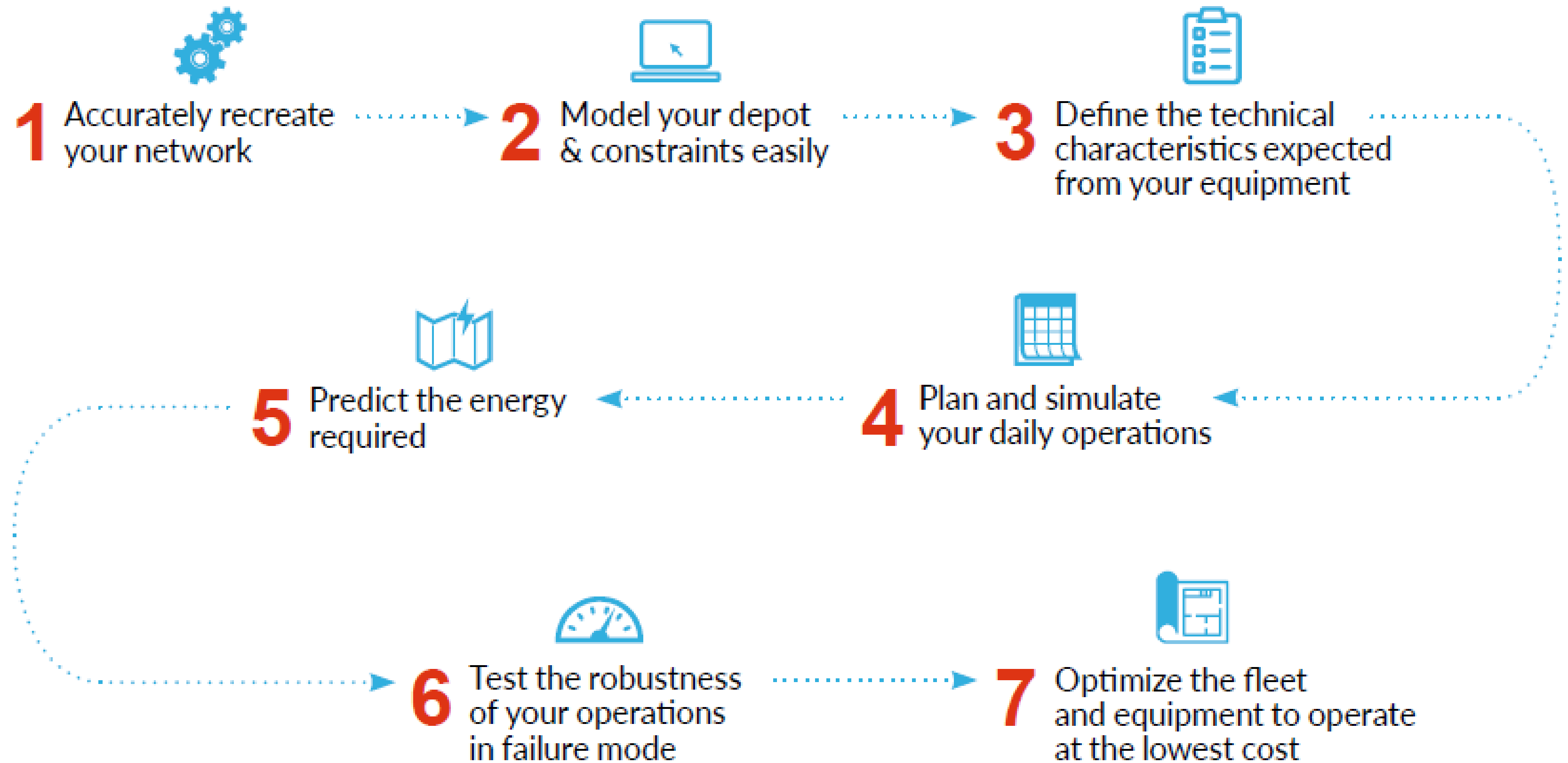
Run peak shaving scenario, Integrate energy cost variation.

Simulate operation & validate charging strategy

Simulate daily operation, Run disruption scenarios, Export charging strategy pattern.



Our approach for E-Mobility studies

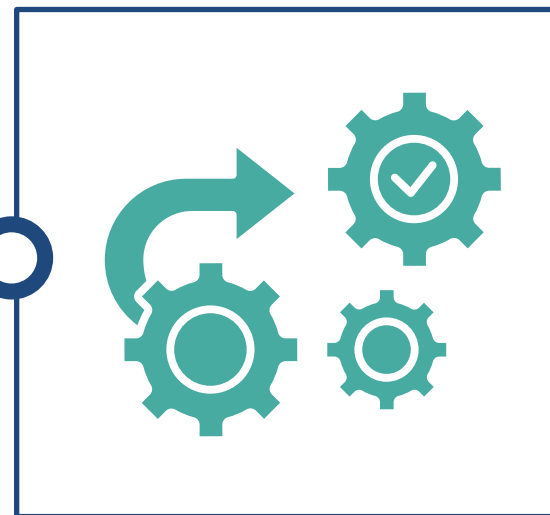


Conclusion

Key to success



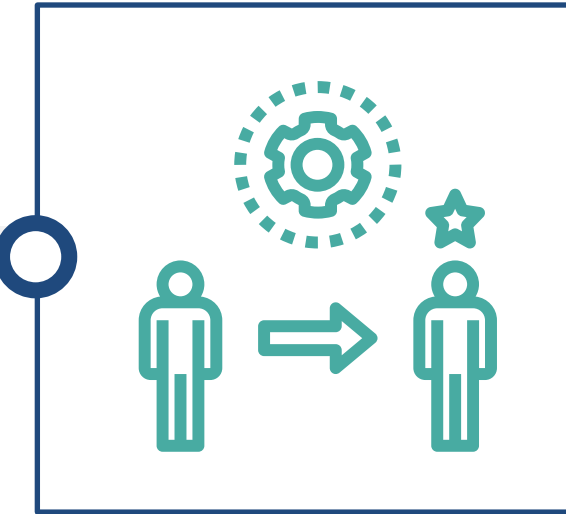
Planning the transition



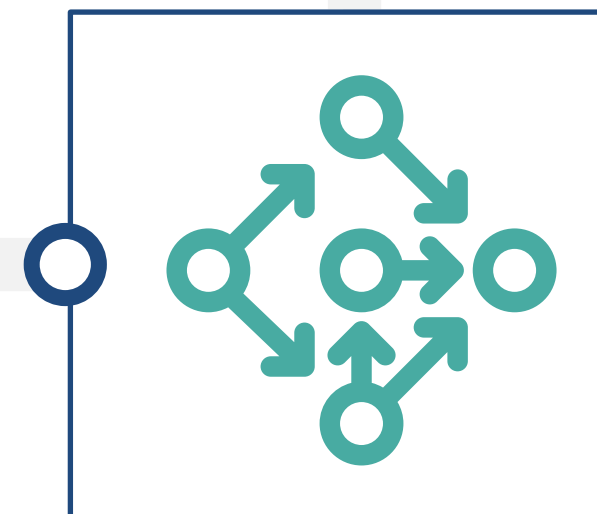
Operational vision



Good knowledge of clients' needs and working methods



Professional evolution assistance



Simulations, critical path



Proactive technological watch

Questions?



in

CARLOS HERNANDEZ

Project Manager, Electrification,
Business Development

chernandez@systra.com



JOHANN BUREAU

Technical Director, Transit

jbureau@systra.com



contact.tess@systra.com



CONFIDENCE MOVES THE WORLD